

In the Claims.

Claim 1 (previously presented): A process comprising:
utilizing microwave excitation of a component within a reaction chamber during
deposition of a material over a substrate within the reaction chamber; and wherein:
phased array microwave radiation is generated externally of
the chamber;
the phased array microwave radiation is passed through a
window and into the chamber; and
the microwave excitation results from interaction of the
component with the phased array microwave radiation in the reaction
chamber.

Claim 2 (previously presented): The process of claim 1 further comprising:
flowing a precursor into the reaction chamber; and
reacting the precursor with the microwave excited component to form the material.

Claim 3 (previously presented): The process of claim 2 wherein the precursor
bonds to the substrate and thereafter reacts with the microwave excited component to form
the material deposited on the substrate.

Claim 4 (previously presented): The process of claim 2 wherein the precursor reacts
with the microwave excited component to form the material which thereafter accumulates
on the substrate.

Claim 5 (previously presented): The process of claim 1 wherein the component is associated with a surface of the substrate during the microwave excitation.

Claim 6 (previously presented): The process of claim 1 wherein the component is not on a surface of the substrate during the microwave excitation.

Claim 7 (previously presented): The process of claim 1 wherein the microwave excited component is part of a plasma within the reaction chamber.

Claim 8 (previously presented): The process of claim 1 wherein the microwave excited component is selected from the group consisting of H, O and N.

Claim 9 (previously presented): The process of claim 1 wherein the material deposited over the substrate comprises a product which includes at least a portion of the microwave excited component.

Claim 10 (previously presented): The process of claim 1 wherein the material deposited over the substrate does not comprise the microwave excited component.

Claim 11 (previously presented): The process of claim 1 wherein the deposition is chemical vapor deposition.

Claim 12 (previously presented): The process of claim 1 wherein the deposition is atomic layer deposition.

Claim 13 (previously presented): The process of claim 1 wherein the deposition is atomic layer deposition, the process further comprising:

sequentially pulsing first and second components into the reaction chamber and purging the components from the reaction chamber between the sequential pulses; the microwave excited component being at least one of the first and second components; and

the microwave excitation resulting from pulses of the microwave radiation into the chamber; the pulses of microwave radiation substantially coinciding with the pulses of one or both of the first and second components into the reaction chamber.

Claim 14 (currently amended): A deposition method, comprising:

providing an apparatus comprising a reaction chamber and a microwave source external to the chamber; the reaction chamber comprising a window through which microwave radiation can pass;

passing microwaves from the source, through the window, and into the chamber;

placing a substrate within the reaction chamber;

flowing one or more materials within the reaction chamber and through the microwaves;

depositing at least a component of the one or more materials onto the substrate;

and

wherein the microwave radiation is phased array microwave radiation associated with a beam that is emitted along a first axis into the chamber and swept along a second axis within the chamber.

Claim 15 (cancelled).

Claim 16 (previously presented): The method of claim 14 wherein the second axis is a linear axis.

Claim 17 (previously presented): The method of claim 14 wherein the second axis is a rotational axis.

Claim 18 (original): The method of claim 14 wherein the window comprises quartz, mica or plastic.

Claim 19 (canceled).

Claim 20 (original): The method of claim 14 wherein the substrate is a semiconductor substrate.

Claim 21 (original): The method of claim 14 wherein the depositing comprises chemical vapor deposition.

Claim 22 (previously presented) The method of claim 14 wherein the depositing comprises atomic layer deposition.

Claim 23 (original): The method of claim 14 wherein the materials flowed through the microwaves comprise a metal-containing material and oxygen, and wherein the depositing forms an oxide of the metal over the substrate.

Claim 24 (previously presented): The method of claim 14 wherein the materials flowed through the microwaves comprise a metal-containing material and nitrogen, and wherein the depositing forms a nitride of the metal over the substrate.

Claim 25 (original): The method of claim 14 wherein the materials flowed through the microwaves comprise a metal-containing material and hydrogen, and wherein the depositing forms a film comprising the metal of the metal-containing material over the substrate.

Claim 26 (original): The method of claim 14 wherein the materials flowed through the microwaves comprise a titanium-containing material and oxygen, and wherein the depositing forms titanium oxide over the substrate.

Claim 27 (original): The method of claim 14 wherein the materials flowed through the microwaves comprise a titanium-containing material and nitrogen, and wherein the depositing forms titanium nitride over the substrate.

Claim 28 (currently amended): A deposition method, comprising:

providing an apparatus comprising a reaction chamber and a microwave source external to the chamber; the reaction chamber comprising a window through which microwave radiation can pass;

placing a substrate within the reaction chamber;

flowing one or more one microwave-inducible constituents into the reaction chamber;

flowing one or more precursors into the reaction chamber;

while the substrate and the one or more microwave-inducible constituents are within the reaction chamber, activating at least one of the microwave-inducible constituents with microwave radiation to form at least one activated species;

depositing at least a component of at least one of the one or more precursors onto the substrate;

reacting the at least one of the one or more precursors with the activated species, the reacting occurring at one or more of before, after and during the depositing; and

wherein the microwave source comprises a phased array microwave antenna, and

wherein the microwave radiation is phased array microwave radiation.

Claim 29 (original): The method of claim 28 wherein the reacting occurs before the depositing.

Claim 30 (original): The method of claim 28 wherein the reacting occurs after the depositing.

Claim 31 (original): The method of claim 28 wherein the reacting occurs during the depositing.

Claim 32 (original): The method of claim 28 wherein the window comprises quartz, mica or plastic.

Claim 33 (cancelled).

Claim 34 (original): The method of claim 28 wherein the microwave-inducible constituent is selected from the group consisting of O, H, and N.

Claim 35 (original): The method of claim 28 wherein the at least one activated species is part of a plasma generated from the microwave radiation.

Claim 36 (original): The method of claim 28 wherein:
the microwave-inducible constituent is selected from the group consisting of O, H, and N;
the deposited component comprises fragment of the precursor, but not an entirety of the precursor; and
the fragment is formed when the at least one activated species reacts with the at least one precursor.

Claim 37 (currently amended): A deposition method, comprising:

providing an apparatus comprising a reaction chamber and a microwave source external to the chamber; the reaction chamber comprising a window through which microwave radiation can pass;

placing a substrate within the reaction chamber;

flowing one or more one microwave-inducible constituents into the reaction chamber;

flowing one or more precursors into the reaction chamber;

while the substrate and the one or more microwave-inducible constituents are within the reaction chamber, activating at least one of the microwave-inducible constituents with phased array microwave radiation to form at least one activated species;

depositing at least a component of at least one of the one or more precursors onto the substrate;

reacting the at least one of the one or more precursors with the activated species, the reacting occurring at one or more of before, after and during the depositing; and

wherein the microwave source extends across an expanse and generates the microwaves along the expanse, the microwaves along one portion of the expanse being selectively tuned relative to the microwaves along a different portion of the expanse.

Claim 38 (previously presented): The method of claim 37 wherein the tuned microwaves form a band of radiation which sweeps across a surface of the substrate during the depositing.

Claim 39 (currently amended): A deposition method, comprising:
providing an apparatus comprising a reaction chamber; a microwave source external to the chamber, and an inlet port extending through the microwave source and into the reaction chamber; the reaction chamber comprising a window through which microwave radiation can pass, and the inlet port extending through the window and terminating in an opening under the window; the apparatus further comprising a gas dispersion plate beneath the opening;

passing phased array microwave radiation microwaves from the source, through the window, through the dispersion plate, and into the chamber;

placing a substrate within the reaction chamber and under the dispersion plate;

flowing one or more materials through the inlet port, across and through the dispersion plate, and into the reaction chamber; the one or more materials being subjected to the microwaves phase array microwave radiation while in the reaction chamber;

depositing at least a component of the one or more materials onto the substrate;
and

wherein the microwave source comprises a phased array antenna.

Claim 40 (original): The deposition method of claim 39 wherein the window comprises quartz, mica or plastic.

Claim 41 (original): The deposition method of claim 39 wherein the window consists essentially of quartz.

Claim 42 (original): The deposition method of claim 39 wherein the gas dispersion plate comprises quartz, mica or plastic; and has a plurality of openings extending therethrough.

Claim 43 (original): The deposition method of claim 39 wherein the gas dispersion plate consists essentially of quartz having a plurality of openings extending therethrough.

Claim 44 (original): The deposition method of claim 39 wherein the window and gas dispersion plate consist essentially of quartz.

Claim 45 (cancelled).

Claim 46 (original): The deposition method of claim 39 wherein the microwave source extends across an expanse and generates microwaves along the expanse, the microwaves along one portion of the expanse being selectively tuned relative to the microwaves along a different portion of the expanse.

Claim 47 (original): The deposition method of claim 39 wherein the microwave source extends across an expanse and generates microwaves along the expanse, the microwaves along one portion of the expanse being selectively tuned relative to the microwaves along a different portion of the expanse; and wherein the tuned microwaves form a band of radiation which sweeps across a surface of the substrate during the depositing.

Claims 48-68 (canceled).